

**Citation:**

Johnson L, Mander AP, Jones LR, Emmett PM, Jebb SA. Energy-dense, low-fiber, high-fat dietary pattern is associated with increased fatness in childhood. *Am J Clin Nutr*. 2008 Apr;87(4):846-54.

**PubMed ID:** [18400706](#)

**Study Design:**

Prospective Cohort Study

**Class:**

B - [Click here](#) for explanation of classification scheme.

**Research Design and Implementation Rating:**

POSITIVE: See Research Design and Implementation Criteria Checklist below.

**Research Purpose:**

To identify a dietary pattern that explained dietary energy density, fiber density, and percentage of energy intake from fat and analyze its relation to fatness in children.

**Inclusion Criteria:**

- Children participating in the Avon Longitudinal Study of Parents and Children (ALSPAC)

**Exclusion Criteria:**

None specifically mentioned.

**Description of Study Protocol:****Recruitment**

- Data from the Avon Longitudinal Study of Parents and Children were used (ALSPAC).
- ALSPAC is a prospective cohort study started in 1991, assessing all aspects of pregnancy, infancy, and childhood growth and development.
- All pregnant women in Avon with an expected delivery date between April 1, 1991 and December 31, 1992 were eligible for recruitment.
- Children in Focus was a random subsample of 1,432 children selected from the cohort that were born in the last 6 months of the recruitment that were invited for regular clinical assessments from birth

**Design:** Prospective cohort study

**Blinding used (if applicable):** not applicable

**Intervention (if applicable):** not applicable

## Statistical Analysis

- Reduced rank regression derived a dietary pattern with the use of dietary energy density, fiber and fat intake as intermediate variables
- Tracking of dietary patterns was assessed by calculating an intraclass correlation coefficient
- Pearson's r correlation coefficients were calculated to assess the relation between 2 continuous variables
- Differences in dietary pattern scores at ages 5 and 7 by categorical variables were assessed by one-factor ANOVA
- Linear regression analysis was used to model the effect of dietary pattern score at ages 5 and 7 years on fat mass at age 9 years
- Logistic regression analysis was used to model the effect of dietary pattern score at ages 5 and 7 years on the odds of excess adiposity at age 9 years

## Data Collection Summary:

### Timing of Measurements

- Diet assessed at ages 5 and 7 years
- Fat mass measured at age 9 years

### Dependent Variables

- Height measured with stadiometer
- Weight measured with Tanita body fat analyzer scales
- BMI
- Fat mass measured with DEXA
- Fat mass index (FMI) was calculated
- Excess adiposity defined as the top quintile of logFMI

### Independent Variables

- Diet assessed with unweighed 3-day diet diaries completed by parents
- Reduced rank regression was used to derive a dietary pattern score
- Dietary energy density and fiber density were calculated

### Control Variables

- Average time spent by children watching television
- Parental socioeconomic information (occupation and education)
- Parental BMI
- Prepregnancy height and weight

## Description of Actual Data Sample:

**Initial N:** 1,432 children in Children in Focus subsample

### Attrition (final N):

- 521 children measured at ages 5 and 9 years (36% of Children in Focus)
- 682 children measured at ages 7 and 9 years (48% of Children in Focus)

**Age:** ages 5, 7 and 9 years

**Ethnicity:** not reported

**Other relevant demographics:**

**Anthropometrics**

**Location:** United Kingdom

## Summary of Results:

### Key Findings

- Pattern score at ages 5 and 7 years was correlated with dietary energy density ( $r = 0.8$ ), fiber density ( $r = -0.7$ ), and percentage of energy intake as fat ( $r = 0.5$ ).
- An increase of 1 standard deviation of pattern score at ages 5 and 7 years, respectively, was associated with a 0.15-kg (95% confidence interval: -0.1, 0.45 kg) and a 0.28-kg (95% confidence interval: 0.05, 0.53 kg) higher fat mass at age 9 years, after controlling for confounders.
- The adjusted odds of excess adiposity at age 9 years for children in quintile 5 compared with quintile 1 of dietary pattern score at ages 5 and 7 years, respectively, were 2.52 (95% confidence interval: 1.13, 6.08) and 4.18 (95% confidence interval: 2.07, 9.38).

### Other Findings

- Pattern loadings at ages 5 and 7 indicated that a high pattern score was associated with low consumption of fresh fruit and vegetables and a high consumption of crisps and snacks, chocolate and confectionery.

## Author Conclusion:

In conclusion, the findings presented indicate that an energy-dense, low-fiber, high-fat diet is associated with greater fatness 2 years or later. The smaller effect size observed for diet at 5 years of age compared with 7 years of age may reflect a deterioration in the innate ability of children to match energy intakes to energy needs, leading to greater weight gain in response to the same pattern of diet in older children. However, there was evidence of tracking of dietary patterns within childhood, which suggests that interventions to change diet should start an early age.

## Reviewer Comments:

*Authors note a limitation of the study is the lack of data on physical activity.*

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## Research Design and Implementation Criteria Checklist: Primary Research

### Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

### Validity Questions

<b>1.</b>	<b>Was the research question clearly stated?</b>	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
<b>2.</b>	<b>Was the selection of study subjects/patients free from bias?</b>	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	???
2.2.	Were criteria applied equally to all study groups?	N/A
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
<b>3.</b>	<b>Were study groups comparable?</b>	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes

3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
<b>4.</b>	<b>Was method of handling withdrawals described?</b>	???
4.1.	Were follow-up methods described and the same for all groups?	???
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	???
4.4.	Were reasons for withdrawals similar across groups?	???
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
<b>5.</b>	<b>Was blinding used to prevent introduction of bias?</b>	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
<b>6.</b>	<b>Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?</b>	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A

6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
<b>7.</b>	<b>Were outcomes clearly defined and the measurements valid and reliable?</b>	<b>Yes</b>
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
<b>8.</b>	<b>Was the statistical analysis appropriate for the study design and type of outcome indicators?</b>	<b>Yes</b>
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
<b>9.</b>	<b>Are conclusions supported by results with biases and limitations taken into consideration?</b>	<b>Yes</b>
9.1.	Is there a discussion of findings?	Yes

9.2.	Are biases and study limitations identified and discussed?	Yes
<b>10.</b>	<b>Is bias due to study's funding or sponsorship unlikely?</b>	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes

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